Alternator or Induction Generator?

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Whether to use an Alternator or an Induction Generator for Steam Turbine applications is a crucial question. Following comparison provides the basic information required to take a decision.

Comparison

Parameter	Induction Generator	Alternator
Application Capacity	Suitable and economical upto 315 kW	Suitable and economical at any power range
Synchronizing	Must always run in synchronized condition with the plant Grid. Synchronizing does not require any electronics or additional safeties. Cannot be operated as an independent power source.	Can be operated in synchronization with the Grid or as an independent power source. Requires additional electronics and safeties for Grid Synchronization.
Part Load Performance	Part Load Performance is very poor. No predictable power possible at less than 50% loading. At lower loads plant's power factor gets affected.	Part Load Performance is excellent. Predictable at lower loadings as low as 25%. Part load efficiency is comparatively better.
Power Factor	Affects the plant's power factor. Capacitor Banks need to me installed and controlled to bring back the power factory to near unity.	Does not affect Power Factor. Sometimes, can also be used for improving the power factor.
Startup	Draws very high inrush current while starting. The plant's installed Transformer Capacity needs to be at least 3 times the Generator's capacity.	Being self exited machine has the ability to start independent of external power source.

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Application Suitability

Following is a list of requirements or qualifications where each of the generator becomes more suitable.

Induction Generator based systems are suitable,	
	• If the power rating is up to about 315 kW. There are installations even upto about 800 kW but can pose serious issues during startup • If the plant load is about 3 times the generator capacity • If the steam flow (power generation) variation is limited between 75% to 100% of the total flow (rated power) • If the power generation system is never going to be used as an independent power source (Island / Stand Alone Mode) • If the power factor can be corrected using capacitor banks or is not very important to maintain at unity.
Alternator based systems are suitable,	
	• Suitable for any power rating • Most suitable if the plant load and the generator capacity are almost equal. If the difference is too large, even then it is the best option. • If you intend to use the generator as an Independent Power source (Island Mode / Stand Alone). • If the steam flow (power generation) variation is very high (between 25% to 100%) • Can be synchronized with the Grid with additional electronics and safeties. • If the plant power factor is very important and needs to be maintained near unity.

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